

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the present application.

1. (Previously Presented) A method of charging a Li-based battery by constant current and then by constant voltage to minimum current, comprising:
 - a. Measuring battery ohmic resistance of a Li-based battery;
 - b. Setting a minimum overvoltage protection value; and
 - c. Setting a minimum charging current depending on the battery ohmic resistance and the overvoltage protection value.
2. (Previously Presented) The method of claim 1, wherein said overvoltage protection value comprises a difference between maximum voltage and instantaneous open-circuit voltage at terminals of the battery after 1 to 10 ms of current interruption.
3. (Previously Presented) The method of claim 1, wherein said minimum charging current is chosen as a ratio of the minimum overvoltage protection value to the battery ohmic resistance.
4. (Previously Presented) The method of claims 1-3, wherein the maximum voltage, V_{max} , ranges between 4.0 and 4.2 V per cell.
5. (Previously Presented) The method of claim 1, wherein the constant voltage is instantaneous open-circuit voltage.
6. (Previously Presented) The method of claim 1, wherein the constant voltage equals maximum voltage.
7. (Previously Presented) The method of claim 1, wherein the constant voltage equals maximum voltage plus a product of the minimum charging current and the ohmic resistance.

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8. (Previously Presented) The method of claim 1, wherein the minimum overvoltage protection is 0 to 50 mV.

9. (Previously Presented) The method of claim 1, wherein a tolerance of supporting constant voltage has to be less than the minimum overvoltage protection.

10. (Previously Presented) The method of claim 1, wherein the minimum charging current reaches 0.6-0.05C rate.

11. (Withdrawn) A method of Li-based battery equalization in a process of battery charging and discharging, comprising periodically connecting an individual lithium cell to a battery lithium cell until voltage of the two cells is getting equal to a dynamically preselected voltage.

12. (Cancelled)

13. (Withdrawn) A method of Li-based battery equalization, wherein three series-connected Ni-based batteries are connected in parallel to an Li-based cell, and the Ni-based cells are part of a charging device.

14. (Withdrawn) A method of hybridizing lithium battery and creating one hybrid power source, wherein a lithium cell permanently contains three series-connected Ni-based cells, wherein the Li-based cell and the Ni-based cells have parallel connection.

15. (Withdrawn) The method of claims 13 and 14 further comprising charging by constant current, and constant voltage, wherein charging is interrupted when charging current reaches stationery value.

16. (cancelled)

17. (Withdrawn) The method of claim 1, wherein ohmic resistance is measured as a ratio of two voltage differences corresponding to two current differences measured within a 1- to 10-millisecond time interval after current interruption.

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18. (Withdrawn) The method of claim 17, wherein one of two currents is zero.

19. (Previously Presented) The method of claim 1, further comprising measuring chemical resistance of the battery.

20. (cancelled)

21. (Currently amended) The method of claim 19, further comprising determining nonstationary open-circuit voltage ~~is defined as~~ as:

$E_0 = V - I(R_{\text{ohm}} + R_{\text{ch}})$, where:

V = battery terminal voltage;

R_{ohm} = ohmic resistance;

R_{ch} = chemical resistance; and

I = current.

22. (Previously Presented) The method of claim 21, wherein nonstationary open-circuit voltage is used to recognize battery state-of-charge.

23. (Withdrawn) A method of measuring battery double layer capacity comprising sampling chemical polarization for 10 to 15 ms after current interruption, and obtaining a ratio of product of current and time interval to chemical polarization difference for this time interval.

24. (Currently amended) The method of ~~claims~~ claim 1, 11, and 14 wherein said battery is an Li-ion battery.

25. (Currently amended) The method of ~~claims~~ claim 1, 11, and 14 wherein said battery is an Li polymer battery.

26. (Currently amended) The method of ~~claims~~ claims 1, 11, and 14 wherein said battery is a metallic Li battery.

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27. (Previously Presented) The method of claim 1, wherein ohmic resistance is measured as the ratio of a voltage difference to a current difference over a time period between 1 millisecond and 10 milliseconds after current interruption.

28. (Previously Presented) The method of claim 21, wherein R_{ch} is measured as a ratio wherein the numerator comprises a difference between a first voltage sampled prior to 10 milliseconds and a second voltage sampled after 150 milliseconds after current interruption, and the denominator comprises a current charge value.